AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to numeral 39 has been added to Figure 2 to indicate the resistance. Also, the right side of Figure 5A has been eliminated to make Figure 5A consistent with the specification. Also, numeral 72 has been changed to numeral 71. Finally, Figure 5B has been amended to be consistent with the specification, page 15, paragraph [0038], lines 10-16.

Attachment: Replacement sheet

REMARKS

The drawings have been objected to because they do not include reference numbers 39, 52, 53 or 54 as recited on pages 12 and 15 of the present application. As the Examiner will note, the drawings have been amended to eliminate this inadvertently. In this connection, numeral 39 has been added to Figure 2 to indicate the resistance. Also, the right side of Figure 5A has been eliminated to make Figure 5A consistent with the specification. Also, numeral 72 has been changed to numeral 71. Finally, Figure 5B has been amended to be consistent with the specification, page 15, paragraph [0038], lines 10-16.

Claims 2 and 3 have been rejected by the Examiner under 35 U.S.C. §112 second paragraph, as being indefinite for failure particularly to point out and distinctly claim the subject matter which the Applicant regards as the invention. This rejection is respectfully traversed.

The Examiner's objection to claim 2 is not understood since it is readily recognized that the application of an actuation pulse should the electrode-mechanical transducer is merely an integral part of the printing process. In any event, claim 3 has been amended for purposes of clarification, accordingly, to the extent that the Examiners objection is understood, it is believed that these objections have been eliminated.

Claims 1-8 have been rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by Zapka et al. (WO 01/36202 A1). This rejection is respectfully traversed.

The present invention is directed to a method of controlling an inkjet printhead containing a substantially closed duct in which ink is situated, in which the duct has at least one exit opening for the ink, wherein an actuation pulse is applied to an electrode-mechanical transducer so that the pressure in the duct changes in such a manner that an ink drop is ejected from the exit opening, measuring the electrical impedance of the electro-mechanical inducer during the application of the actuation pulse and adapting the actuation pulse on the basis of the measured impedance.

In the course of the printing process, not only will the material properties and particularly the expansion characteristic of the electro-mechanical inducer slowly change, but also the mechanical construction itself is also subject to change. This results in the fact that a specific actuation pulse will come in the course of time, give a different drop ejection which results in a decline in characteristics. The present invention makes use of the realization that the electrical impedance of the electro-mechanical transducer is dependent on the same parameters as those that determine the pressure change in a duct as a result of a specific actuation pulse. And accordingly, the present invention contains the steps of measuring the electrical impedance of the electromechanical transducer during the application of the actuation pulse and adapting the actuation pulse on the basis of the measured impedance.

The Zapka et al. reference is directed to a droplet deposition apparatus in which the capacitance of the walls of dummy chambers in the printhead is used to provide an indication of the temperature of the droplet fluid to enable the magnitude of the actuating electrical signals applied to the actuable walls of the fluid ejection chambers to be adjusted. On page 15 lines 16-24, the Zapka et al. reference clearly explains how the patentees inkjet printhead is designed. Thus, the printhead 10 is formed with a multiplicity of parallel fluid chambers or channels, including fluid ejection channels 2a and "dummy" channels 2b from which fluid is not, or not intended to be ejected during printing. As further noted on page 17 lines 7-11, dummy channel 2b may be located adjacent each fluid ejection channel 2a. Alternatively, or additionally, a plurality of fluid ejection channels 2a may be located between a pair of dummy channels. Thus, it is the capacitance (impedance) of the apezi electric walls of these dummy chambers that is measured in order to derive information corresponding to the temperature of the printheads (please see page 17, line 31 to page 18, line 1 of the Zapka et al. reference). This fact is further detailed on page 18 of the Zapka et al. reference where it is recited that since the wall 52 is non-actuable, any necessary application of electrical signals to the wall 52 for a measurement of the chosen electrical property of the wall has no influence on the standard printing operation of the printhead. Furthermore, in referring to Figures 13 and 14, the reference illustrates an embodiment of an arrangement for utilizing the capacitance of the non-actuable walls 52 of a pair of dummy channels 2b to provide an indication of the temperature of the ink for in the fluid

injection channels located between the dummy channels. Thus, it is made explicit what the advantage is of the fact that the capacitance of a non-actuable wall (that is, of a transducer that is not intended to be actuated in order to cause the ejection of an ink drop) is measured. Thus, the measurement has no influence on the actual print operation of the printhead. Thus, this teaching is incomplete contrast with the present invention where in an actuation pulse is applied to a transducer so that an ink drop is ejected from the exit opening of the corresponding duct. Then, the impedance is measured from the same transducer. Thus, the present invention, the impedance of a transducer that is actuated with the intention of actual ink drop ejection is measured, and not the impedance of a transducer corresponding to a dummy duct. This is clear from reading the present application as a whole, and in particular if reference is made to page 13, paragraph 33 which states that each ink dot of the printhead is provided with a measuring circuit. This arrangement clearly teaches away from the Zapka et al. reference which teaches connecting the transducer of dummy ducts only with a measuring circuit. Thus, since the method and printer of the present invention are directed to measuring the impedance of a transducer that is actuated in order to actually eject an ink droplet, it is believed that the claims of the present application are clearly distinguishable over the teachings of the Zapka et al patent.

Accordingly, in view of the above amendments and remarks reconsider of the objections and rejections and allowance of the claims of the present application are respectfully requested.

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Respectfully submitted,

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Attachments